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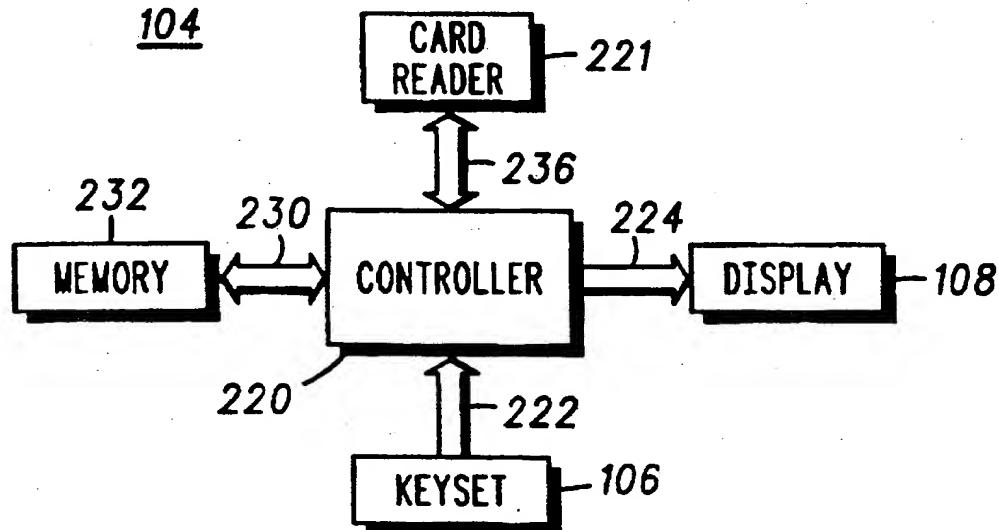
(58) Field of Search

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(54) Method and apparatus for dynamic radio communication menu

(57) A radio communication device menu system includes memory (232) storing menu items. A controller (220) is coupled to the memory. A user controlled input (106) is coupled to the controller for manually inputting control signals to the controller. A display (108) is also coupled to controller to display signals from the controller. The memory has a short menu and an extended menu, and the controller is responsive to a predetermined actuation pattern of the user controlled input to add to the short menu from the extended menu, or to remove items from the short menu.

FIG. 2



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FIG. 2

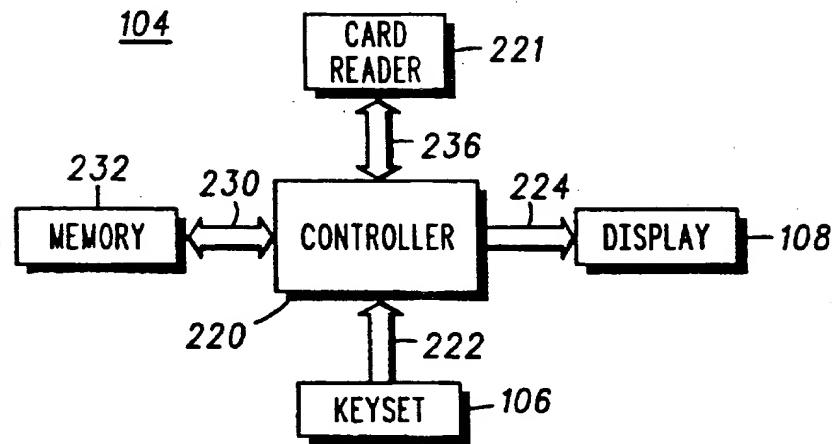
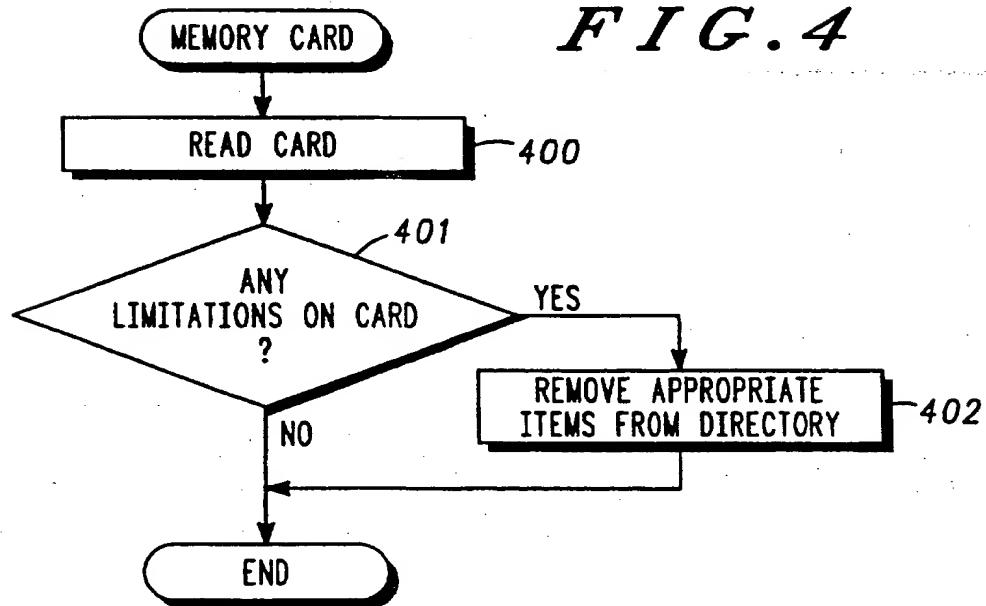


FIG. 4



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FIG. 3 B

CALL RELATED FEATURES (CONTINUED)	PHONE SETUP (CONTINUED)
TINT 1 CALLS EXCEPT HOME ALL CALLS TURN OFF CALL BARRING INCOMING CALLS WHEN ROAMING BARRING ALL CALLS OFF CHANGE BARRING PASSWORD	ON OFF SELECT KEYPAD TONES NORMAL TONES SINGLE TONES NO TONES PHONE STATUS STATUS REVIEW MASTER REST(EP5) MASTER CLEAR(EP5)
CALL RESTRICTIONS KEYPAD DIALING ON OFF PHONE NUMBER LENGTH ON(EP7) OFF INCOMING CALLS ON OFF	

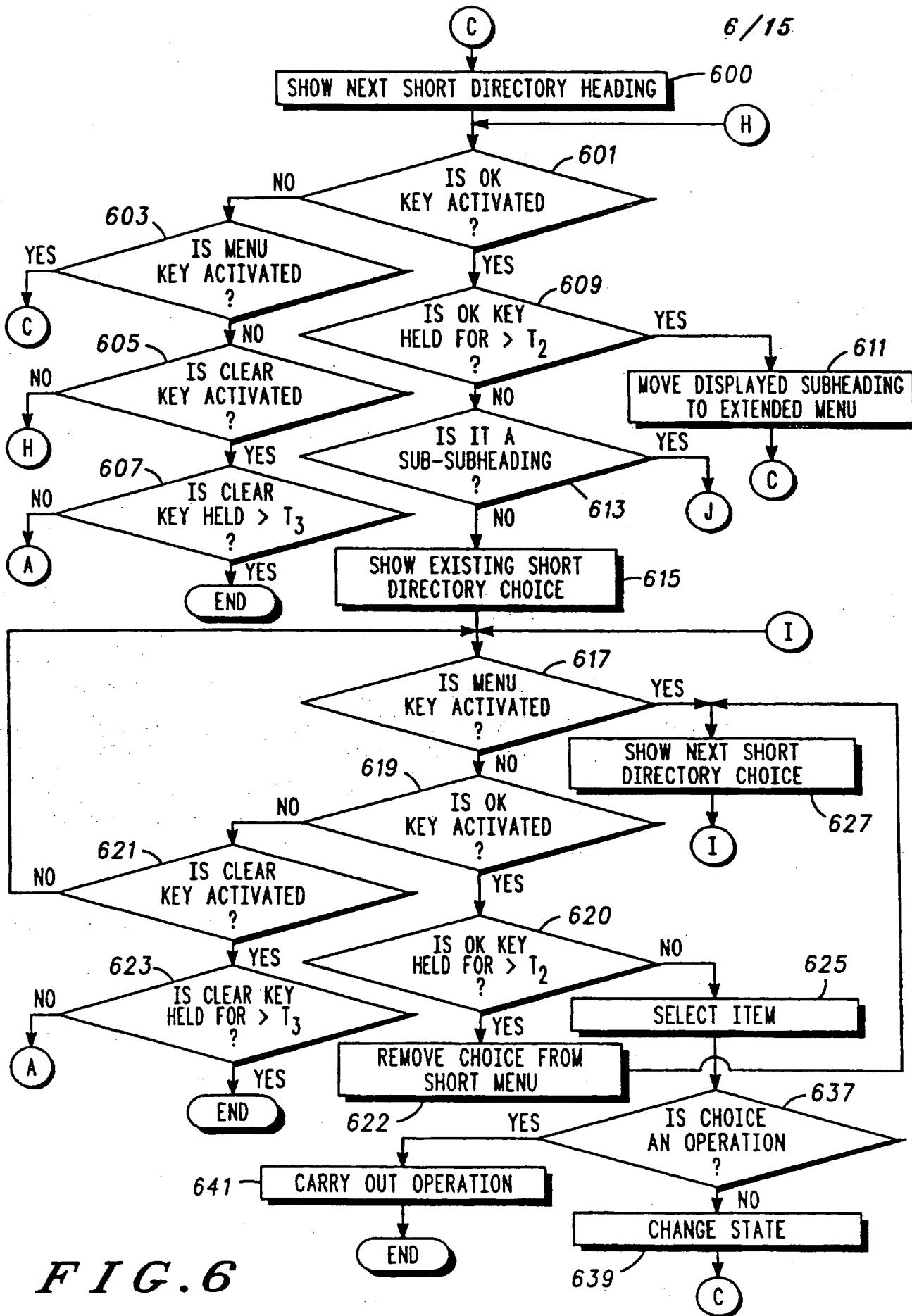


FIG. 6

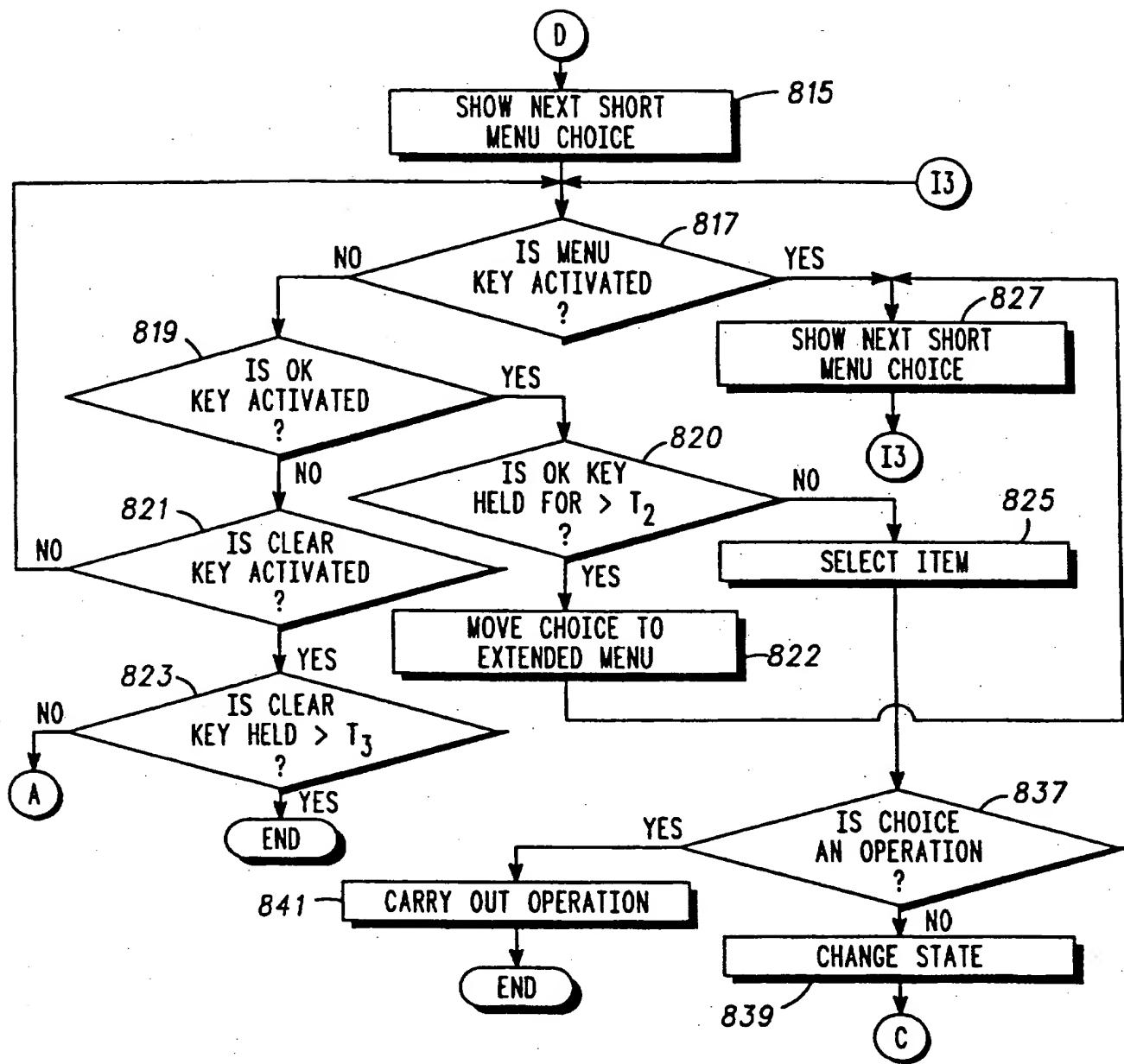


FIG. 8

FIG. 10A

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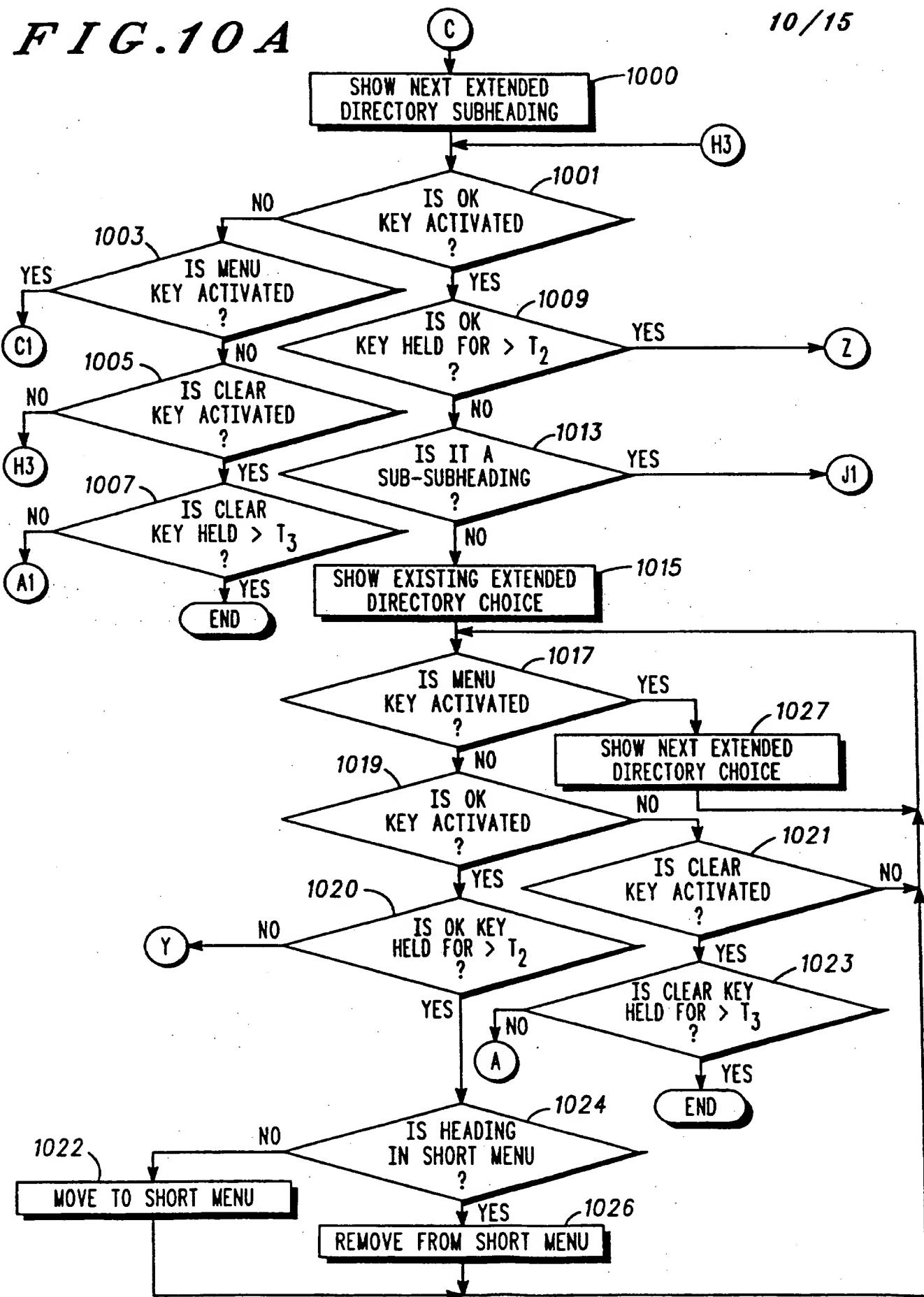
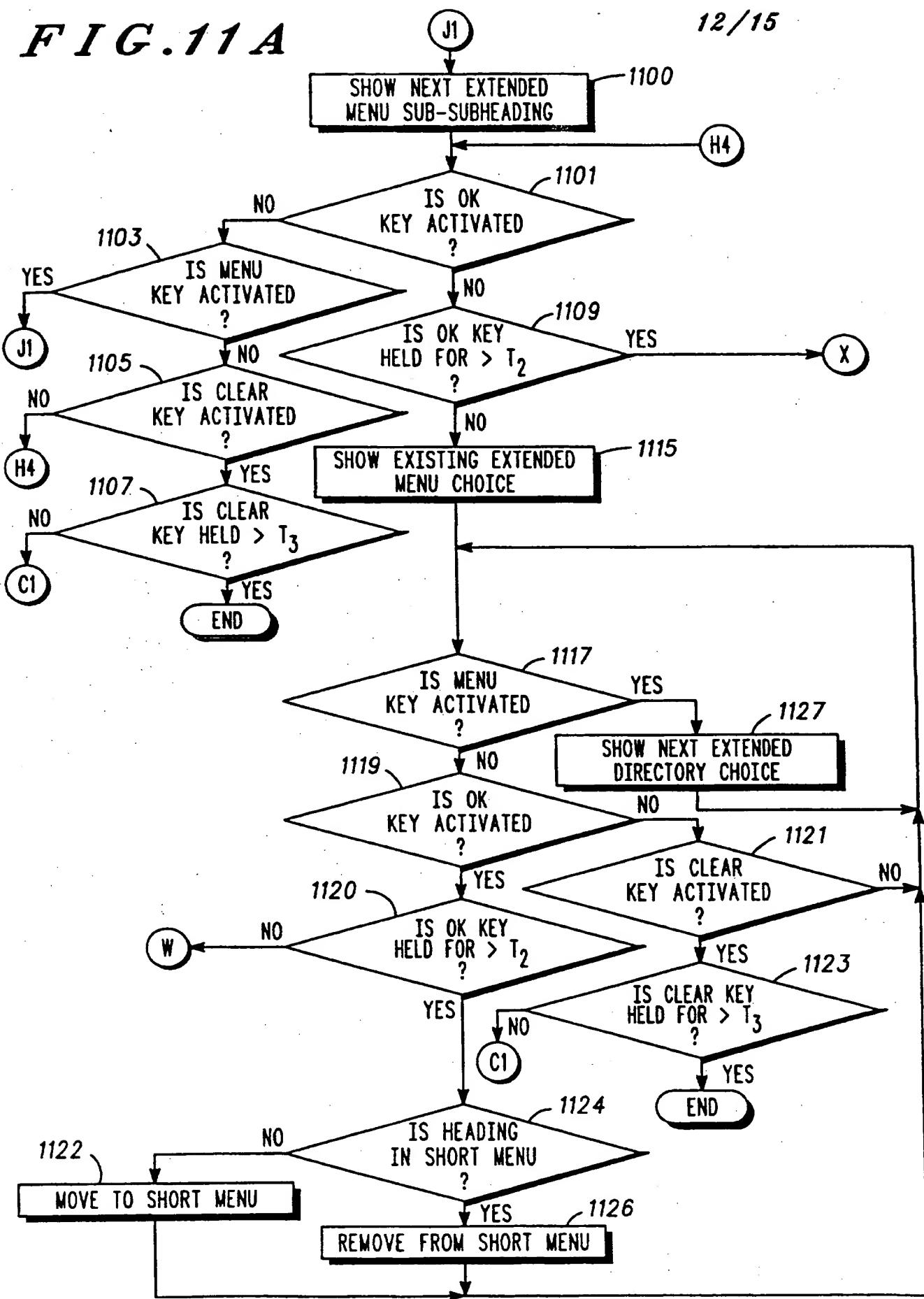


FIG. 11A

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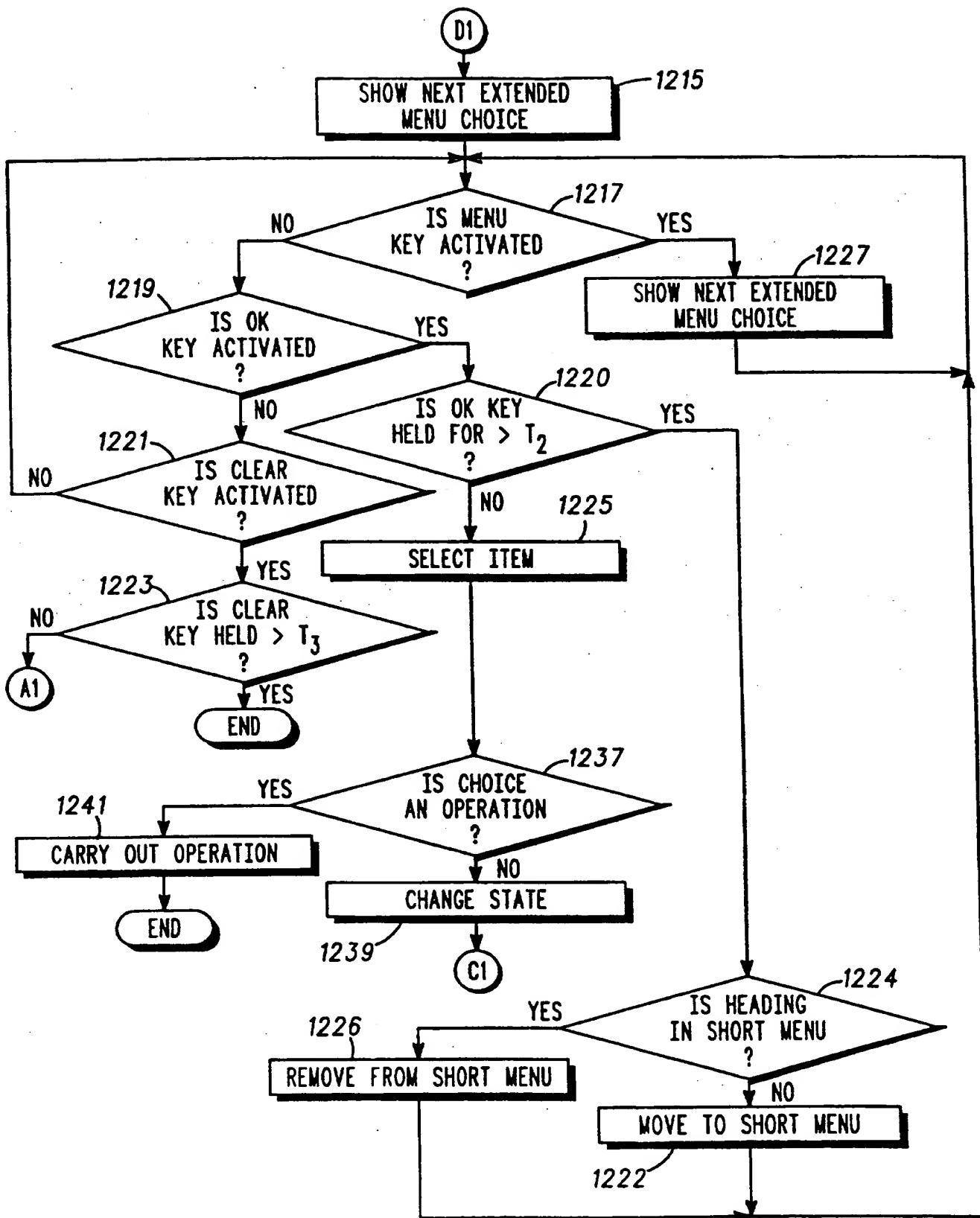


FIG. 12

**Method and Apparatus for Dynamic Radio
Communication Menu**

Field of the Invention

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The present invention pertains to radio communication devices and more particularly to a menu system for such devices.

Background of the Invention

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As radio communication devices become more complex, including more features, it has become increasingly challenging to provide a user friendly interface. One man machine interface that has been developed is a menu system. Menu systems include a display and control keys.

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This display sequentially displays the features available to the user under the guidance of the control keys. An advantage of these menu systems is that they provide a way for the user to scroll through the features of the phone.

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Although menu systems are easy for users to utilize, they have some disadvantages. If the system has one menu, the menu may be long and arduous to utilize, since the user must scroll through a lot of undesired features to find a particular feature that they are looking for. If the system includes a short menu and an extended menu, the user may find it difficult to switch from the short menu to the extended menu when the user does not find the feature that they are looking for in the short menu.

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Accordingly, it is desirable to provide a menu system which is easier for the user to utilize.

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Brief Description of the Drawings

FIG. 1 is a front elevational view illustrating a radio telephone;

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FIG. 2 is a circuit schematic in block diagram form illustrating a menu system circuit for the radiotelephone according to FIG. 1;

includes a phone book interrupt key 112, a message interrupt key 114, menu interrupt key 116 and a clear key 118. The radio telephone is designed to operate with a card 119, which may be a memory card or a SIM card.

5 The keyset 106 is connected to a controller 220 (FIG. 2) through a data bus 222. The controller may be implemented using a suitable commercially available microprocessor such as a Motorola MC 68332 microprocessor. The controller is connected to display 108 through a data bus 224. The controller is also coupled through a bi-directional data 10 bus 230 to a memory 232. The memory 232 is a dynamic memory for storing short and long menu items. The menu is implemented using any suitable memory, such as a commercially available EEPROM. A card reader 221 is coupled to controller 220 via data bus 236. The card reader 221 (FIG. 2) for reading the card 119 is connected to the controller and 15 may be implemented by any suitable card reader.

In operation, controller 220 is responsive to input signals from the keyset 106 to selectively control the menu information stored in memory 232 that is displayed on display 108. A catalog of the information, or items, that are sequentially displayed on the display 108 are illustrated in 20 FIG. 3. Because the display is small, one item of is displayed at a time. The order of the items in the menu system is fixed, in that each item found in the catalogue cannot be completely removed from the catalog by the user. However, it is also envisioned that the user could have some 25 control in the selection of the order of the menu features, and that some method may be provided to change the features of the menu system. For example, memory card 119 (FIG. 1) could be utilized to change the menu system.

A directory is shown in FIG. 3. The directory shows the following seven branches:

- 30 1. Call Related Features;
 2. Phone Set-Up;
 3. Messages;
 4. Phone Book;
 5. Network Selection;
 6. Call Meters; and
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5 Status, Network Search, Set Meter Format, Set Call Cost Rates, and Show Lifetime Meter headings, and the items therein, are only viewed in the full menu as shipped from the factory. The other items in FIG. 3 are thus default short menu items in the radiotelephones shipped from the factory. Additionally, it is envisioned that the order of the branches as shown in FIG. 3 does not change, such that the menu will always scroll through the items in the order illustrated. Those items which are only in the extended menu are skipped, such that they are viewed, in the short menu mode.

10 10 It is envisioned that the directory is dynamic to card 119 (FIG. 1). Thus, if card 119 does not permit the user to have certain options, such as Saving Preferred Networks or it requires a SIM card PIN, these options are automatically removed. This occurs when the SIM, or memory, card is inserted into the radio telephone. In operation, the controller 220 (FIG. 15 2) communicates with the SIM card through card reader 221. The controller determines what limitations are required by the SIM card, as indicated in blocks 400 (FIG. 4) and 401. If there are any limitations, the items, or choices, that the SIM card does not allow are removed from the menu, as indicated in block 402. This limits the number of items in the 20 directory making it easier to use, and removes non-functional items that the user might otherwise get frustrated trying to use.

25 The operation of the menu system will now be described. When the menu key 116 is activated, the system enters the menu mode. In the menu mode, the controller 220 determines whether the menu key 116 was held for greater than a predetermined, or threshold, time period T1, as illustrated in decision block 501 (FIG. 5). For example, Time T1 can be two seconds. If the menu key is held for greater than time period T1, the controller 220 goes to the extended menu, described in FIGs. 8-11, as illustrated in block 503. If however, the menu key is held for shorter than 30 time T1, the menu remains in the short menu operation, and the controller 220 will show the first branch ("Call Related Features") after time period T1 has elapsed, as illustrated in block 505. While the branch is displayed, the controller 220 will determine whether the OK key 110 is activated, as determined in decision block 507. If the OK, or selection, 35 key 110 is activated, the controller proceeds to location A to show the

clear key 118 is activated in decision block 527. If the clear key is not activated, the controller 220 returns to point G, to wait for actuation of the OK key (decision block 523), the menu key or the clear key. The controller 220 thus waits for the OK key, the menu key, or the clear key to be activated before taking a further action.

If it is determined at decision block 527 that the clear key is activated, the controller 220 determines whether the clear key was held for greater than predetermined, or threshold, time period T3. If the clear key is held for longer than time T3, the controller 220 exits the menu program. Holding the clear key for greater than period T3 thus provides a means of quickly exiting the menu program. If however, the clear key was activated for less than time period T3, the controller 220 will move up one level to point F, showing the next menu branch. This allows the clear key to be used to step up one level (for example from the short menu headings to the short menu branch). T3 is selected to be approximately 3 seconds.

If it is determined in decision block 523 that the OK key was activated, the controller 220 determines whether the OK key was held for a time period greater than a predetermined, or threshold, time period T2, as indicated in decision block 531. If the OK key was held for a time period greater than T2, the controller 220 removes the displayed heading from the short menu, such that the item may only be viewed from the extended menu as indicated in decision block 533. This allows items to be easily moved from the short menu to the extended menu using the OK key. The program will then show the next short menu heading. If the OK was not held for a time period greater than T2, as determined in decision block 531, the controller 220 determines whether the next level is a subheading or a choice. If the next level is a subheading, the controller 220 goes to C. If, on the other hand, the next menu level is a choice, the controller 220 goes to D.

If the next level is a subheading (point C in FIG. 6), the controller 220 displays the next short menu subheading on display 108, as indicated in block 600 (FIG. 6). While the subheading is displayed, the controller determines whether the OK key is actuated in decision block 601. If the OK key is not activated, the controller determines whether the

period greater than T3, in decision block 623. If the clear key is held for a time period greater than T3, the controller 220 exits the menu routine. If, however, the clear key is held for a time period less than T3, the controller 220 returns to the next higher level at A (FIG. 5), and displays the next

5 branch heading. This allows the user to return to a higher level.

If the OK key is the first key activated, as determined in decision block 619, the controller 220 determines whether the OK key was held for greater than period T2, as indicated in decision block 620. If it was held for greater than period T2, the controller removes the choice displayed on display 108 from short menu, such that it is no longer viewed in the short menu, as indicated in block 622. If the OK key is held for less than, or equal to, time period T2, the controller selects the choice displayed on display 108, as indicated in block 625. Following the selection of a choice in block 625, the controller 220 will determine whether the choice requires a change of state or if the controller is to carry out a particular operation, or function. If the choice is a choice, the controller 220 changes the state, as indicated in block 639, and returns to show the next subheading. If the choice is an operation, the controller 220 carries out the operation as indicated in block 641, and then ends the menu routine.

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If the menu key was determined to be activated in decision block 617, the controller 220 scrolls to the next short menu choice, as indicated in block 627. Controller 220 then waits for actuation of the next key in decision blocks 617, 619, and 621.

If the next level is a sub subheading (point J in FIG. 7), the controller 220 displays the next short menu sub-subheading on display 108, as indicated in block 700 (FIG. 7). While the sub-subheading is displayed, the controller determines whether the OK key is activated in decision block 701. If the OK key is not activated, the controller determines whether the menu key 116 is activated in decision block 703. If the menu key is activated, the controller 220 shows the next short menu sub-subheading as indicated in block 700. The menu key is thus used to scroll through the sub-subheadings.

If, the menu key 116 is not activated, as determined in block 703, the controller 220 determines whether the clear key is activated, as indicated in decision block 705. If the clear key is not activated, the

If the OK key is the first key activated, as determined in decision block 719, the controller 220 determines whether the OK key was held for greater than period T2 in decision block 720. If it was held for greater than period T2, the controller moves the choice displayed on display 108 to the extended menu, such that it is no longer in the short menu, as indicated in block 722. If the key is held for less than, or equal to, time period T2, the controller selects the choice displayed on display 108, as indicated in block 725. Following the selection of a choice in block 725, the controller 220 will determine whether the choice requires a change of state or if the controller is to carry out a particular operation, or function. If the choice is a change of state, the controller 220 changes the state, as indicated in block 739, and returns to show the next sub-subheading. If the choice is an operation, the controller 220 carries out the operation as indicated in block 741, and then ends the menu routine.

If the menu key was determined to be activated in decision block 717, the controller 220 scrolls to the next short menu choice, as indicated in block 727. Controller 220 then waits for actuation of the next key in decision blocks 717, 719, and 721.

If it is determined in decision block 535 that the next level is a choice, the controller 220 controls display 108 to show the existing menu choice at point D (FIG. 8), as indicated in block 815. The controller then waits for the menu key 116 to be activated in decision block 817, the OK key to be activated in block 819, or the clear key to be activated in decision block 821. If the OK key, the menu key, and the clear key are not activated, the controller 220 will continue to show the existing menu choice.

If the clear key is activated first as determined in decision block 821, the controller 220 determines whether the clear key is held for a time period greater than T3 in decision block 823. If the clear key is held for a time period greater than T3, the controller 220 exits the menu routine. If, however, the clear key is held for a time period less than T3, the controller 220 returns to the next higher level at A (FIG. 5), and displays the next heading. This allows the user to return to a higher level.

If the OK key is the first key activated, as determined in decision block 819, the controller 220 determines whether the OK key was held for

block 909, the controller will show the next extended menu branch, as indicated in block 913

With the menu branch displayed, the controller 220 determines whether the selection key has been activated as shown in decision block

5 915. If the OK key has not been activated, the controller 950 determines whether the menu key 110 is activated, as indicated in decision block 917. If the menu key is activated, the controller will show the next menu branch as indicated in block 913. If the menu key is not determined to be activated in block 917, the controller 220 determines whether the clear key 118 has been activated, as indicated in block 919. If the clear key has not been activated, the controller 220 returns to point E, block 915, and waits for the OK key 110, the menu key 116, or the clear key 118 to be activated. If the controller determines in block 919 that the clear key was activated, the controller exits the menu.

15 If it was determined in decision block 915 that the OK key 110 was activated, the controller 220 exits the menu branch level and enters the extended menu heading level. The controller enters the branch that was displayed on display 108 at the time that the OK key was activated, as referenced by block 921. With the extended menu heading displayed, 20 the controller determines if the OK key 110 is activated in decision block 923. If the OK key is not activated, the controller determines whether the menu key 116 is activated in decision block 925. If the menu key is activated, the controller 220 scrolls to the next extended menu heading, skipping any extended menu items. If it is determined in decision block 25 925 that the menu key 116 is not activated, the controller 220 determines whether the clear key 118 is activated in decision block 927. If the clear key is not activated, the controller 220 returns to point G, to wait for actuation of the OK key (decision block 923), the menu key or the clear key. The controller 220 thus waits for the OK key, the menu key, or the 30 clear key to be activated before taking a further action.

If it is determined at decision block 927 that the clear key is activated, the controller 220 determines whether the clear key was held for greater than predetermined, or threshold, time period T3. If the clear key is held for longer than time T3, the controller 220 exits the menu program. Holding the clear key for greater than period T3 thus, provides

block 1005. If the clear key is not activated, the controller 220 returns to H and waits for the OK key, the menu key, or the clear key to be activated. If the clear key is activated, as determined in decision block 1005, the controller 220 determines whether the clear key is held for greater than time period T3 in decision block 1007. If the controller 220 determines in decision block 1007 that the clear key is held for a time period greater than T3, the controller 220 goes to B, ending the menu key routine, or mode. If, however, the clear key is held for less than time period T3, the controller 220 moves up one level to A and shows the next extended 5 menu heading. This allows the user to exit the subheading level and move to a higher level using the clear key.

If the controller 220 determines in decision block 1001 that the OK key was activated, the controller determines whether the OK is held for greater than time period T2 in decision block 1009. If the OK key was 10 held for a time period greater than T2, the controller 220 determines whether the item displayed in display 108 when the OK key is activated is in the short menu, as indicated in block 1010. If it is not, the controller moves the displayed heading to the short menu as indicated in block 1011. This allows items to be easily moved from the extended menu to 15 the short menu using the OK key. If the item was in the short menu, the controller removes the item from the short menu, as indicated in block 1012. This allows items to be moved from the short menu in the extended menu mode. In either case, the controller 220 then shows the next menu subheading at block 1000.

If it is determined in decision block 1009 that the OK key was held 20 for less than time period T2, the controller 220 determines whether the next lower level in the heading displayed while the OK was activated is a subheading or a choice, as indicated in decision block 1013.

If the next level is a choice, the controller 220 controls display 108 25 to show the existing menu choice as indicated in block 1015. The controller then waits for the menu key 116 to be activated in decision block 1017, the OK key to be activated in block 1019, or the clear key to be activated in decision block 1021. If the OK key, the menu key, and the clear key are not activated, the controller 220 will continue to show the 30 existing menu choice.

If the next level is a sub subheading (point J in FIG. 11), the controller 220 displays the next extended menu sub-subheading on display 108, as indicated in block 1100 (FIG. 11). While the sub-subheading is displayed, the controller determines whether the OK key is activated in decision block 1101. If the OK key is not activated, the controller determines whether the menu key 116 is activated in decision block 1103. If the menu key is activated, the controller 220 shows the next extended menu sub-subheading as indicated in block 1100. The menu key is thus used to scroll through the sub-subheadings.

If, the menu key 116 is not activated, the controller 220 determines whether the clear key is activated, as indicated in decision block 1105. If the clear key is not activated, the controller 220 returns to H2 and waits for the OK key, the menu key, or the clear key to be activated. If the clear key is activated, as determined in decision block 1105, the controller 220 determines whether the clear key is held for greater than time period T3 in decision block 1107. If the controller 220 determines in decision block 1107 that the clear key is held for a time period greater than T3, the controller 220 goes to B, ending the menu key routine, or mode. If, however, the clear key is held for less than time period T3, the controller 220 moves up one level to C and shows the next extended menu heading. This allows the user to exit the subheading level and move to a higher level using the clear key.

If the controller 220 determines in decision block 1101 that the OK key was activated, the controller determines whether the OK is held for greater than time period T2 in decision block 1109. If the OK key is held for greater than time period T2, the controller 220 in decision block 1109. If the OK key was held for a time period greater than T2, the controller 220 determines whether the item displayed in display 108 when the OK key is activated is in the short menu, as indicate in block 1110. If it is not, the controller moves the displayed heading to the short menu as indicated in block 1111. This allows items to be easily moved from the extended menu to the short menu using the OK key. If the item was in the short menu, the controller removes the item from the short menu as indicated in block 1112. This allows items to be moved from the short menu in the

- If the OK key is held for less than, or equal to, time period T2, as determined at decision block 1120, the controller selects the choice displayed on display 108, as indicated in block 1125. Following the selection of a choice in block 1125, the controller 220 will determine
- 5 whether the choice requires a change of state or if the controller is to carry out a particular operation, or function. If the choice is a change of state, the controller 220 changes the state, as indicated in block 1139, and returns to show the next sub-subheading. If the choice is an operation, the controller 220 carries out the operation as indicated in
- 10 block 1141, and then ends the menu routine.
- If the menu key was determined to be activated in decision block 1117, the controller 220 scrolls to the next extended menu choice, as indicated in block 1127. Controller 220 then waits for actuation of the next key in decision blocks 1117, 1119, and 1121.
- 15 If it is determined in decision block 535 that the next level is a choice, the controller 220 controls display 108 to show the existing menu choice at point D (FIG. 12), as indicated in block 1215. The controller then waits for the menu key 116 to be activated in decision block 1217, the OK key to be activated in block 1219, or the clear key to be activated
- 20 in decision block 1221. If the OK key, the menu key, and the clear key are not activated, the controller 220 will continue to show the existing menu choice.
- If the clear key is activated first as determined in decision block 1221, the controller 220 determines whether the clear key is held for a time period greater than T3 in decision block 1223. If the clear key is held for a time period greater than T3, the controller 220 exits the menu
- 25 routine. If, however, the clear key is held for a time period less than T3, the controller 220 returns to the next higher level at A (FIG. 5), and displays the next heading. This allows the user to return to a higher level.
- 30 If the OK key is the first key activated, as determined in decision block 1219, the controller 220 determines whether the OK key was held for greater than period T2 in decision block 1220. If the OK key was held for a time period greater than T2, the controller 220 determines whether the item displayed in display 108 when the OK key is activated is in the short menu, as indicate in block 1224. If it is not, the controller moves the
- 35

menu system would operate in substantially the same manner as described above. However, whenever the menu key is activated, the menu mode changes between the short and extended menu at the same level. Thus, if the display 108 shows a short menu heading when the
5 mode key 111 is activated, the menu would change to the extended mode and the display would continue to show that heading.

Thus it can be seen that a menu system is disclosed which is versatile in operation and easy to use. The user can change between extended and short menus readily. Additionally, the user has a great
10 deal of flexibility in selecting items for the short and extended menus.

3. The radio communication device menu system as defined in claim 2, wherein the user controlled input further includes a selection key.
4. The radio communication device menu system as defined in claim 3, wherein the controller enters the extended menu when the menu key is held for more than a predetermined time period.
5. The radio communication device menu system as defined in claim 4, wherein the controller adds a particular menu item to the short menu when the selection key is held for more than a predetermined time period while the display is displaying the particular menu item in the extended menu.
6. The radio communication device menu system as defined in claim 4, wherein the controller removes a particular menu item from the short menu when the selection key is held for more than a particular time period while the particular item is displayed.
7. The radio communication device menu system as defined in claim 1, further including a clear key which is held for a first predetermined time period to return to a higher level in the menu system and is held for a second predetermined time period to exit the menu.

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(56) Documents Cited

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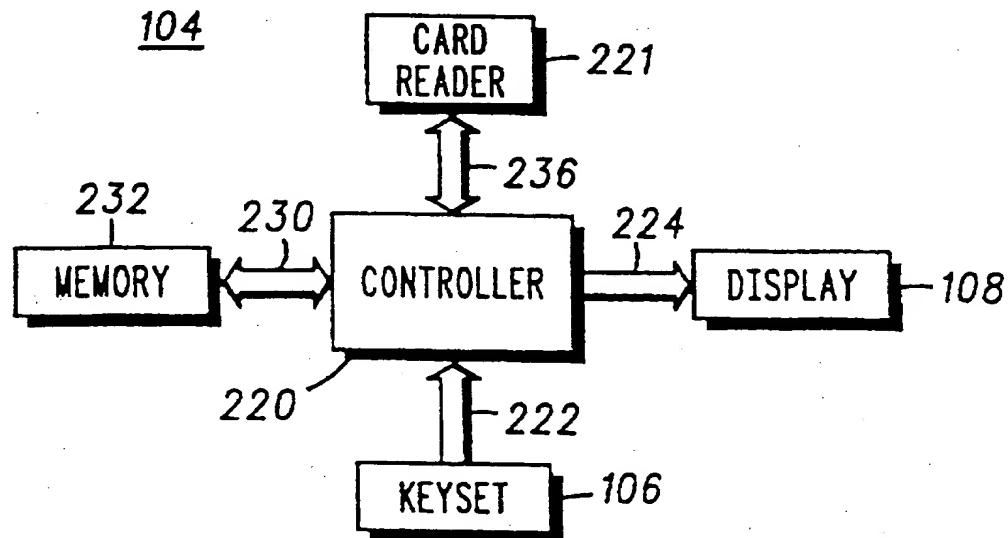
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(54) Method and apparatus for dynamic radio communication menu

(57) A radio communication device menu system includes memory (232) storing menu items. A controller (220) is coupled to the memory. A user controlled input (106) is coupled to the controller for manually inputting control signals to the controller. A display (108) is also coupled to controller to display signals from the controller. The memory has a short menu and an extended menu, and the controller is responsive to a predetermined actuation pattern of the user controlled input to add to the short menu from the extended menu, or to remove items from the short menu.

FIG. 2



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